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Drummond, Andrew Thomas
Canadian timber trees

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# CANADIAN TIMBER TREES:

## THEIR DISTRIBUTION AND PRESERVATION.

BY A. T. DRUMMOND.

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*From the Report of the Montreal Horticultural Society and Fruit Growers' Association.*

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# CANADIAN TIMBER TREES.—THEIR DISTRIBUTION AND PRESERVATION.

BY A. T. DRUMMOND.

Apart from agriculture, no individual industry in Canada has such importance as the lumber trade. In the United States, industries based on the manufacture of lumber and timber are only exceeded in point of magnitude by the iron interests. The extent of territory on this Continent covered by forests, the number of men directly employed in preparing the products of these forests for market, and the very numerous and important industries to which the use of timber and lumber give rise, all point to the subject of our timber trees as of national interest. We have, in fact, little conception of the magnitude of the lumbering business in the country, until we are brought face to face with statistics in regard to it. About twenty-one per cent. of the whole American Continent is believed to be woodland. In North America alone, it is estimated that 1,460,000,000 acres are covered by trees, and of this quantity about 900,000,000 are in Canada. Contrast this with the acres of forests and woodlands in the European States. Prussia has, it is said, about 10,000,000 acres; Bavaria, 3,300,000, France, 2,700,000; whilst England and Belgium are so denuded of forests as to have but insignificant areas of these in proportion to their sizes. These vast woodlands in Canada include a very considerable portion of Ontario and the eastern provinces, and of British Columbia, whilst in Manitoba, the country, excepting in the Eastern and North-Western sections, is chiefly prairie, and in the North-West Territories, the true forests are largely along and north of the Saskatchewan.

A few facts will give some conception of the importance of these vast woodlands to us, and at the same time of the enormous annual drain on our lumbering resources now going on. In the three

years ending 1872, when the lumber trade saw its halcyon days, the production of deals and boards in the Ottawa and St. Lawrence valleys alone, amounted to an average annually of 809,000,000 feet. The average number of logs annually cut in those valleys, and brought to the banks of the streams to be floated down to the saw mills engaged in the production of this large quantity of deals and boards, was 5,264,000. Whilst of the product of these mills an annual average of 170,000,000 feet went to Great Britain, 93 cargoes were, in 1872 alone, shipped to South America, and 276,000,000 feet were taken by the Eastern United States; that part of this large quantity which was shipped by the water routes being embraced in 1,720 cargoes.

During the same three years the exports of square timber from Quebec averaged 21,558,000 cubic feet annually. The square timber went chiefly to Great Britain, and whilst about three-fifths of it was white pine, there was included no inconsiderable proportion of other trees. Nearly one-sixth was composed of oak, one-twelfth of red pine, one-nineteenth each of birch and elm; ash basswood, tamarac, walnut and butternut largely making up the balance.

But aside from lumber and square timber cut for export, there is an enormous consumption in the Dominion—a consumption greatly increased by the progressive spirit of the past thirty years. There are in the Dominion about 6,000 miles of railroads, which originally required in their construction 18,000,000 of sleepers or railway ties, and, taking the life of a tie at five years, the annual requirements of these railways must be towards 3,500,000 ties. Each railway has its telegraph system requiring originally the cutting down of 175,000 young trees to supply the requisite poles, and a large annual addition to replace those which become decayed or otherwise unserviceable. On the sides of the railways would be probably 12,000 miles of fencing, necessitating 9,000,000 pickets, and over 60,000,000 feet of sawn timber in its contruction. House-building and pavements alone must annually consume an enormous amount of lumber; but wood enters very largely even into the manufacture of what we are accustomed to regard as insignificant

articles. Shoe pegs are estimated to require in the United States an annual supply of 100,000 cords, whilst lasts and boot-trees require 500,000 more. Even the manufacture of tools consumes on this continent about half a million cords of the finest qualities of timber.

Vegetation is not distributed over the globe regardless of order. There is a regular series of changes from the tropics to the Arctic seas. Under the equator are the palms, bananas and plantains: in the tropical zones on either side are the fig-trees and ferns of tree-like growth; beyond the immediate tropics are included some of the vast sandy barrens or deserts of the warmer regions of Africa, Asia, and America, in which grow the succulent fig-marigolds and curious cacti; in higher latitudes are the countries of the orange, the pomegranate and the vine, with the zone of the pines, firs and other evergreens beyond, shading thence gradually through heathers and grasses, until at the base of the glaciers in polar lands vegetation is chiefly met with in the form of variously colored lichens mottling the bare rock. A series of changes precisely corresponding to this is met with on mountain sides. Vines are cultivated in the valleys at the base of the Alps; in the course of the ascent chestnuts, beech trees, firs and little downy Alpine plants become successively prevalent until at about 9000 feet the region of continuous snow begins. These successive changes in the vegetation are not inaptly likened to a series of belts of somewhat irregular breadth bound one above the other around the mountain sides.

Canada lies partly in the Arctic zone, characterized by an absence of trees, partly in a semi-Arctic zone of poplars and birches, and partly in two more temperate zones of pines and beech trees, whilst in the southern sections are a few of the characteristic trees of the Middle United States.

There are sixty-five species of trees in Ontario, Quebec and the Maritime Provinces. Of these, excepting perhaps one, all are found in Ontario, south of the Ottawa River and Georgian Bay, whilst probably a dozen range as far north as James Bay.

Not much is yet known of the range of our timber trees west of

Lake Superior, but we are now fairly familiar with it in the country around that lake and eastward of it to the Atlantic Ocean. The eastern provinces are within the region of the tree forests, whilst a very large part of Manitoba and an immense section of the territory between that province and the Rocky Mountains is more or less open prairie. The vast country commencing with Labrador and thence skirting Lake St. John, Hudson Bay and the north shores of Lake Nipigon, onwards to the Saskatchewan and Peace River northward, forms the zone of the balsam, poplar, white birch, aspen and tamarac. South of this in the Provinces of Quebec and Ontario are the zones of the pines and the beech—the beech being chiefly limited to the region south of a line drawn from the outlet of Lake Superior to Quebec. In that part of the peninsula of Ontario lying west of the Niagara River is an outlier of another zone, represented there by the walnut, buttonwood, tulip tree, sassafras and the chestnut, and by an increasing abundance of white, red and other oaks.

There are various causes influencing the range of vegetation in the Dominion, but in Ontario and Quebec the northern limits of trees are largely circumscribed by the physical condition of the country as well as by the climate. The height of land or watershed from which the rivers flow on the one side to Hudson Bay, and on the other to the great lakes and the St. Lawrence, has a very tortuous course, and beyond it very few species of trees range northward. The country on either side of this watershed for some distance is more or less mountainous. To the northward of Lake St. John the whole country is very broken, whilst extensive cold swamps are everywhere interpersed through the Albany River section. Both the red and white pine appear to follow somewhat closely the watershed in their northern limits of range.

To the most casual observer the absence of trees and of mosses is a striking feature of the prairies of Manitoba and westward. That the frequent fires which devastate the prairies have much to do with the scarcity of trees is beyond question. This very scarcity, however, gives rise to a more than ordinary rapid evaporation of moisture from the soil and thus deprives the mosses of that con-

dition which is so congenial, and in most cases, necessary to their growth, and accounts thus for their absence.

The section of country surrounding Lake Superior has a peculiar flora. On the lake margin, but especially on its jutting headlands the vegetation has almost a semi-Arctic type. The beech and white oak are everywhere absent, while on the north shore the red oak, maple and basswood are almost entirely wanting. But it is less among the trees than among the herbaceous forms that the vegetation is striking. On Keweenan Point and Thunder Cape are semi-Arctic plants—the remnants—like the Maritime plants of this and other great lakes—of a former flora, and suggestive of the colder climate of that part of the country in a now-past epoch. The moist, cool but equable atmosphere, resulting from the presence of such a large body of deep water as Lake Superior, readily accounts for the continuance of these little plants there, and has much to do with the absence of so many of the larger forms of vegetation. A short distance inland from Thunder Bay—and this no doubt is a mere illustration of what occurs everywhere on the coast of the lake—there is, however, a remarkable change. As the effect of the lake air becomes less perceptible, plants of more temperate range appear, until at about two miles or more up the Kaministiquia River no boreal or semi-Arctic plants are met with, and the vegetation has much the appearance of that of the river valleys of Central Canada.

The vegetation of the projecting headlands of the lakes is affected by the action of the general flow of the waters of these lakes towards the sea, plants peculiar to the southern and western sides of the lakes being thus found on the immediate shores of the northern sides as well. On the other hand, the coasts of the Lower St. Lawrence are influenced by the cool atmosphere attending the Labrador Arctic Current, a branch of which enters the Gulf of St. Lawrence by the Straits of Belle Isle.

So rapidly has the Western Ontario Peninsula been brought under cultivation that we can hardly now realize the extent to which it was covered by magnificent forests fifty or more years ago. In 1834 this part of the country was visited by Robert Brown and

James Macnab, and their observations are thus referred to by J. C. Louden: "In the neighbourhood of the falls of Niagara the trees were of various descriptions, of great size, and more intermixed than we had hitherto seen. The tulip trees were of great height, with stems varying from 8 ft. to 12 ft. in circumference. Platanus trees, oaks, elms, limes, ashes, walnuts, beeches, poplars and white pines were all equally large and lofty. The hemlock spruce was scarcely seen, but the arbor vitæ seemed to take its place, for it is, without exception, the most abundant tree in the neighbourhood of the falls, very tall, and sometimes tapering to a height of 60 ft. Between Niagara and Hamilton was the only district in Canada where the Laurus Sassafras was seen: the trees were all small though remarkably healthy. The great natural forests of the country presented chiefly oaks of great height, and when the ground became in the least degree elevated, white pines abounded. Near New London (now London) the specimens of the trees, particularly of the platanus (plane tree or buttonwood) were very large. Stems were measured of from 15 ft. to 20 ft. in girth, and many of the trees had straight trunks of from 10 ft. to 30 ft. high before branching. The white pine near New London has a trunk varying from 13 ft. to 18 ft. in circumference, and some trees which had been blown down were measured and found to average 160 ft. in length. The oaks here vary from 10 ft. to 15 ft. in circumference of trunk, with 45 ft. and 50 ft. of straight clear stems. Between New London and Goderich, a distance of 60 miles, the road passes through one continued dense forest. The trees were principally elms, averaging from 10 ft. to 25 ft. in circumference. Mixed with them were beeches, birches and ashes of ordinary dimensions. Horizontal sections of the white pines and hemlock spruce exhibited between 300 and 400 annual layers; oaks 200; and elms 300. On the banks of the Maitland River many very noble specimens of platanus are seen with stems varying from 18 ft. to 36 ft. in circumference."

The extent to which the different species of timber trees individually occur in Canada is a matter of great interest in view of the increasing demand for lumber. The PLANE TREE or BUTTON-

WOOD, and the CHESTNUT are hardly now in sufficient abundance to make them economically important, and, as already indicated, their range in Canada is very circumscribed. The BUTTONWOOD grows most luxuriantly on the banks of rivers, in deep, moist soil. BLACK WALNUT has become scarce, and threatens soon to become virtually extinct. It is now chiefly found with us on the tributaries of the River St. Clair. BUTTERNUT and WHITE OAK have about a similar range in Eastern and Western Ontario, and though not now of very large size, are in fair abundance, especially in the Western Peninsula; but in the Province of Quebec they are comparatively scarce, White Oak becoming a rare tree in the St. Lawrence Valley towards Quebec, though found inland. Butternut is said to be absent on Bay of Fundy coast. BASSWOOD is on the whole plentiful in the country lying south of a line, drawn from the Bay of Fundy to Thunder Bay. In Southern Manitoba it is also a well-known tree. In Western Canada it enters somewhat largely into the commoner classes of furniture. Even as far north as the Manitoulin Islands it is frequent, and is there a large tree, sometimes attaining two feet in diameter. A small outlying number of these trees, as well as maples, around Lake St. John, would seem to indicate a milder climate there than the high latitude of the lake would suggest. RED OAK is entirely absent from the whole north shore of Lake Superior, excepting, curiously, Michipicoten Island. It is a common, though not now a very large tree, throughout Ontario, occurring as far north as Lake Temiscamingue at the head-waters of the Ottawa; and in the Province of Quebec ranges down the St. Lawrence Valley towards the neighbourhood of Quebec. YELLOW BIRCH appears to be a more familiar tree in this valley than around the great lakes. In Gaspé square timber two feet across is made from it. WHITE BIRCH, on the other hand, is a more northern tree, occurring everywhere far north, and in considerable abundance—even at Moose Factory, on Hudson Bay, being large enough for canoes.

WHITE ASH is fairly common from the neighborhood of Montreal West to the Georgian Bay District and Manitoulin Is-

lands and Southward. BEECH has a somewhat similar range, but is found farther down the St. Lawrence Valley, and occurs on the northern shores of Lake Huron. In Central and South-Western Ontario it is perhaps the most commonly met with tree. In New Brunswick, though met with inland, the beech is absent from the Bay of Fundy coast—the result, probably, of the heavy fogs there.

SUGAR MAPLE is an abundant tree in Nova Scotia, Prince Edward's Island and New Brunswick, throughout the St. Lawrence Valley, and in Western Ontario as far as the north shore of Lake Huron and as the east and west, but not the north coasts of Lake Superior. ASPEN and BALSAM POPLAR, whilst familiar trees throughout Ontario and Quebec, range far Northward from Newfoundland to James Bay and northwestward, and are most abundant in these higher latitudes. WHITE ELM, perhaps our most graceful tree and forming also a valuable item of export, is fairly common from Gaspé to Lake Nipigon and Southward, and especially in the western peninsula of Ontario. In the valley of the Moose River, about 120 miles from its mouth, Prof. Robert Bell has found a small outlier of these trees. RED CEDAR as a shrub extends high northward, but as a tree it is scarce north of the Georgian Bay and north or eastward of the Ottawa River, and is little known in the Ottawa Valley. On the other hand, WHITE CEDAR, or ARBORVITÆ, is common everywhere from Gaspé and Lake St. John through the upper Gatineau district to James' Bay and southward. Even in the Ontario peninsula it grows luxuriantly, attaining a height of sometimes from 50 to 60 feet. In New Brunswick it is not uncommon, but in Nova Scotia and Newfoundland it seems to be wanting.

HEMLOCK occurs in Nova Scotia, but is rare or wanting on the east coast of New Brunswick, and is wanting in Gaspé and in the Lake Superior district, whilst in the Province of Quebec, south of the St. Lawrence, it is very abundant, its bark forming there a most important item of export. In the Ottawa Valley and in the Ontario peninsula it is a fairly well known tree. TAMARAC is comparatively common throughout both Ontario and Quebec, and even as far northward as Moose Factory, on Hudson Bay, is a large tree measuring two feet in diameter of its trunk.

The WHITE and RED PINES are, however, the trees in which centre perhaps the most interest. PITCH PINE is of mere local occurrence and the BANKSIAN PINE, though abundant in the Lake Superior region eastward to the Lower St. Lawrence and of merchantable size, according to Prof. Robert Bell, along the southern branches of the Albany River, is in the more accessible sections only a scrubby tree. In the Province of Quebec south of the St. Lawrence little pine is now left, though thirty years ago large lumbering operations were carried on in the country lying south of Quebec and east of Sherbrooke. In the Ontario peninsula as well, pine is now scarce and even what is there is of small size. The maximum development of the red and white pine appears to have been attained in the stretch of country extending from Gaspé and New Brunswick through Northern Maine and the Saguenay district along the valley of the St. Lawrence westward to the Ottawa River and Georgian Bay, and onward through Northern Michigan and the district on the north shore of Lake Huron and the Lake Superior country to Rainy Lake. In Eastern Manitoba there is some pine, but the zone of true forests beyond that province onward to the Rocky Mountains chiefly includes aspen, balsam, poplar, white birch and Banksian pine. Large as this territory is in which the white and red pine are found, the extensive sections of country now left quite destitute of pine warn us that these pine forests are not co-extensive with our annual requisitions on them. In the Ontario Legislature it was recently stated that one source of revenue of that province was visibly affected because that now—though this is probably an error—there were no more timber limits available, all apparently being under lease to lumbermen. At the present time the St. Lawrence and Ottawa valleys furnish the larger part of the pine lumber and timber. Very nearly as much is annually cut on the St. Lawrence and its tributaries below Montreal as in the Ottawa valley, but contrary to the general impression and to the customs returns, very nearly two-thirds of the square timber and the lumber, manufactured on the Upper Ottawa is, as Mr. A. J. Russell has pointed out to me, from the Ontario forests. Some conception of the abundance of these trees in these valleys, and also

of the enormous requisitions annually made by lumbermen upon our pine forests, is shown by the fact already referred to that during the years 1870, 1871 and 1872, the average number of logs banked upon the small streams tributary to the St. Lawrence and Ottawa was over five and one quarter millions annually.

The map which accompanies this report, and which is the joint production of Prof. Robert Bell of the Geological Survey of Canada and the writer, indicates our present knowledge of the northern limits of distribution of the leading forest trees in Ontario, Quebec and the Maritime Provinces. In the projection of this map the sources of information have been largely derived from personal observation of Prof. Bell and the writer, but, in addition, all reliable published lists have been consulted, and access has been had to the private notes of the late Dr. John Bell, Dr. D. Maclagan, of Edinburgh, and others; whilst from Mr. James Richardson, Mr. R. W. Ells, and some other members of the Geological Survey, and from Prof. Macoun, of Belleville, Prof. Bailey and Mr. E. Jack, C. E., of Frederickton, N.B., and Dr. Lawson, of Halifax, N.S., much valuable information has been obtained. Mr. A. J. Russell, of the Crown Timber Office, Ottawa, has also supplied some data connected with the distribution of the pine, besides being the source of some important facts and statistics regarding timber limits and the production of square timber, which have been freely made use of in this report. Possibly, as the country is further explored, the lines indicated on the map may be slightly changed, and some trees may be found of local occurrence—as in the case of the elm, basswood, plane tree and maple—in places considerably north of the limits laid down, and our information regarding the range of trees in Nova Scotia, New Brunswick and Prince Edward's Island is not quite so full as could be desired. The map will, however, be found to fairly represent the northern limits of distribution.

## PRESERVATION OF THE TIMBER TREES.

So important is the lumber industry in Canada, that, looked at from a commercial point alone, perhaps no trade question has around it so much of interest as that of the conservation of our

forests with a view to the continuance of that industry. The drain which has been going on for thirty years past on the resources of these forests has been so enormous and so continued that though it may have contributed largely to swelling our exports, drawing wealth to the country and giving us increased commercial status in other countries, it yet opens up the consideration of how long the supply will last. And if, as is self-evident, under the present system of farming out the public lands, a day is drawing near when the supply will not equal the demand, it behooves us, if possible, to adopt some means to preserve or recuperate these forests. A reference to the accompanying map will convince any one acquainted with the localities—each year extending further northward and westward—where the lumbermen obtain their logs, that the area in which the pine may be expected to be found in fair abundance and accessible at a moderate cost, is not so extensive but that another twenty years of working the timber limits to the extent done for a few years past, will result in a very sensible lessening of our exports of white pine. The lumberman's axe is not, however, the only, or even the greatest drain on the pineries. Forest fires, it is believed, have caused even greater destruction, not only by reason of the vast area ruined, but because that large and small trees are alike consumed, as well the huge trunk which would be suitable for the lumbermen as the smaller trees, which in the course of successive years would also become large enough to attract their attention. The extent of this ruin will be appreciated when it is remembered that not until the pine is about one hundred years old is it of good merchantable size for square timber, and that therefore to replace the pine groves would be the work of towards a century. There is, however, the further important fact that after a forest fire, pines are usually replaced by a growth of birch, poplar, and other trees, though whether the pine gradually asserts its position and overshadowing these in turn replaces them, is a question yet to be settled.

Two very pertinent considerations therefore present themselves :—

First, forest fires and their prevention.

Second, the regulations regarding the sale of timber limits to lumbermen.

FOREST FIRES.

No person who has visited the Saguenay District, the Upper Ottawa, the shores of Lake Superior, and the Albany River Country, can be blind to the fact that forest fires have been a source of vast ruin. Many hundreds of square miles have been laid waste by them, and these fires are generally the result of carelessness or wilful criminality. There are Acts of Parliament in both the Provinces of Quebec (Act of 1870) and Ontario (Act of 1878) laying down regulations for their prevention, and imposing fines for neglect of these regulations; but forest fires continue, and no one appears to be punished. Lumbermen and others are ready to blame the Indians for carelessness in regard to their camp fires, but are not white men more frequently blameable, and with their greater knowledge and intelligence more criminally culpable? The statutes, however, are defective. That for Ontario provides that no person shall start any fire on or near a forest, between the first of April and the first of November, except for the purposes of clearing land, cooking, obtaining warmth, or for some industrial purpose, and then in a very indefinite way goes on to require that when clearing land "every reasonable care and precaution" shall be observed. Now, why should it not be made unlawful to start fires in the woods *at any time of the year* except for such purposes?—and even with the object of clearing land, why should this virtually unrestricted permission be given during the midsummer months, when there is most danger from it and least necessity for it? The Quebec Statute goes a step farther and forbids the starting of any fire at any time whatever except for the above recited purposes, and in cases of clearing of land, makes it unlawful between the 1st July and the 1st September. Now this close period might be very safely extended in both provinces to the period between the 15th June and the 15th September, or even the 1st June and 1st October, without interfering in the slightest degree with the necessities of the settler, and thus the heated term would be entirely passed. Both Acts provide in-

structions in cases of fires required for cooking, warmth or industrial purposes, and the Ontario Act very properly makes it imperative that every person in charge of a drive of timber, survey or exploring party, or any other party requiring camp fires, shall once in each week read and explain to his men the provisions of the Act. The Quebec Act omits this very necessary precaution, necessary because railway and other surveyors are sometimes among the greatest offenders against the Act. The Quebec Act also omits the proviso which the Ontario statute includes, that locomotive engineers shall have their fire boxes properly guarded and their smoke-stacks furnished with screens. Both Acts, however, only impose a penalty of fifty dollars or three months imprisonment if that is not paid, for any infringment of the Act. Now, when such wholesale destruction is often the result, why should the offender receive so light a punishment? Why should not the offence be visited with heavy imprisonment without the option of a fine? Those in charge of drives of timber, surveying parties, &c., should be made personally responsible for the acts in this respect of those under them, under the penalty of a fine, whilst the actual culprit should in all cases be liable to imprisonment. So important is this question of the protection of the forests from fires, not merely to the governments which have the administration of the Crown Lands, and to lumbermen who lease them, and to the bankers who make advances on timber limits, but also to the large number of settlers in the new districts who have been in the past and are liable to be in the future rendered destitute and homeless through these bush fires, that it is suggestive whether it would not be well that every Crown Lands agent or bushranger should be constituted a fire inspector, whose duty should be to enquire into the cause of each bush fire, with a view to the detection and punishment of the offender. As facts now are, the offender is probably in most cases an employee, from whom the amount of the fine could never be collected, and hence there could be no attraction to an informer to go to the large amount of trouble and expense necessary in these distant districts to secure a conviction.

## REGULATIONS REGARDING THE SALE OF TIMBER LIMITS TO LUMBERMEN.

Under the present system timber limits are put up at auction at an upset price and sold to the highest bidder. The buyer by paying an annual fee thereafter and dues on the timber or logs actually cut, can retain the limit in Ontario so long as he complies with the regulations, and in Quebec until 1889. He can in Ontario cut any size of tree, but in Quebec is limited to those over twelve inches. In both provinces the license gives permission to cut trees of any and all kinds without restriction, except on lots which the Government may subsequently sell, when the license is restricted in Ontario to pine. Even if in Quebec a lumberman cuts timber under the twelve inches, there are no fines imposed beyond the possible forfeiture of the license if the Government choose to enforce it. Now the grave objections of this system are that it subjects the public lands to unrestricted waste for just such length of time as the lumberman finds it profitable, without any regard to the future; and, on the other hand, it places the Government in the position of an owner desirous of making the largest possible immediate return, regardless of the impoverishment of his possessions in the near future.

The principle of leasing the timber limits for an indefinite period of time, and of allowing trees of any size or kind to be cut, is hardly defensible. There should be a limit in girth beyond which alone a tree should be considered merchantable. The forests should also at intervals be allowed a long rest to admit of the young trees growing up, and the Government as the lessee, and not the lumberman with his self-interest always at stake, should be the judge of what that rest should be and when it is required. It may be said that timber limits under the present system afford a means of financing, and further that if mill-owners erect expensive saw-mills they should have some certainty that they will always have a source from which in coming years to obtain their logs. It is, however, on the one hand a question whether timber limits with the great uncertainty attached to them about the kind and

quantity of timber on them and their constant exposure to forest fires, form the most advisable class of security for a banker to take, and on the other hand, whilst the mill-owner has some reasonable claim for regard, yet the interests of the country at large must necessarily be paramount to his individual interests and, at any rate, his case is not different from that of every other manufacturer who has in a similar way to provide himself for the future with supplies of raw material. If all timber limits were leased for a limited term only—say for five years—all mill-owners would be placed on terms of equality, and limits would in addition be kept out of the hands of speculators. A result which would almost of necessity also follow the shortening of the term of lease, would be that smaller areas would be purchased. As to the period of rest which should be allowed there is room for discussion. In a paper on the pines, read by Mr. John Langton some years ago before the Literary and Historical Society of Quebec, a table was given showing the estimated rate of growth, and from this it would appear that at 100 years in age, the pine is about fifteen inches in diameter, and that the annual increase between that age and 200 years is very nearly one-fifth of an inch. If this be a correct estimate, twenty-five years would not be too long a respite, as even in that time the trees could not increase to a size sufficient for good square timber, though large enough for saw-logs.

It is asserted that in getting out the larger timber there is a great deal of unnecessary and reckless damage done to the younger trees, which might be prevented by more stringent regulations.

To sum up these conclusions:

1. Limits should only be sold for short periods of time, say for five years, and in smaller areas than in former years has been the practice.

2. No trees of a less girth than fifty inches at a height of twelve inches from the ground should be cut, and heavy penalties should be imposed if they are.

3. On reverting to the Government, each timber limit should be allowed to rest, say at least twenty-five years, to enable the younger trees to attain merchantable size.

4. The strictest regulations should accompany each lease, with a view to preventing damage to, or the destruction of the smaller trees.

The Government, with such regulations might possibly obtain a smaller upset price per square mile at auction for limits, but not necessarily so, as the smaller area sold would enable the lumberman to cut within the shorter time all the merchantable timber. The restriction to cutting such trees as are fifty inches or more in girth, would leave the younger timber standing, and the twenty-five years respite would afford time for this younger timber to attain merchantable size.

The Dominion Government has made an effort to encourage tree culture in Manitoba, by making a free grant of 160 acres of land in the prairie districts to each person who undertakes to plant a portion of the property with trees under specified conditions, but the effort has not met with very much success thus far.

(*When compiling the large Map of the Dominion of Canada which was subsequently sent to the Paris Exhibition, the Department of Public Works requested a loan of this Map, and permission to use it in the completion of their own was granted, consequently the lines on both will be found to correspond.*)

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